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## MEMORANDUM

TO: File

FROM: Adam Loney//

RE: **Acetaldehyde Background Summary**  
**South Dayton Dump and Landfill, Moraine, Ohio (Site)**

REF. NO.: 038443-61

DATE: November 7, 2012

Conestoga-Rovers & Associates (CRA) has prepared this memorandum to document the available data for acetaldehyde arising from the Vapor Intrusion (VI) Investigation at the Site. Acetaldehyde has been detected in several indoor air, sub-slab soil vapor, and ambient air samples collected within, adjacent to, and under buildings at or near the Site. CRA recommends that the acetaldehyde data be rejected and no further analysis for acetaldehyde (or other TICs) be completed. This memorandum explains the rationale behind this recommendation.

Acetaldehyde is not part of the United States Environmental Protection Agency (USEPA) Toxic Organics (TO) Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) (TO-15 Method). However, at USEPA's request, CRA requested that the lab report any tentatively identified compounds (TICs) detected in air samples collected during the second round of the VI Investigation. Acetaldehyde was detected as a TIC in the following samples:

Sample Type:				Sub-Slab	Indoor Air/ Crawl Space	Outdoor Air
Criteria:		Acetaldehyde ODH Screening Level (Residential (R))		25	2.5	2.5
		Acetaldehyde ODH Screening Level (Non-Residential (NR))		110	11	11
Location	Address	Owner/Tenant	Sample Date:			
Building 4	1901 Dryden	Valley Asphalt (NR)		100 UJ	37 J	15 J
Building 18	2225A East River	Ron Barnett Residential Trailer (R)	7/31/2012	N/A	8 J	5.2 J
Building 28	2229 Dryden	Vinny's Restaurant (NR)	9/11/2012	28 J	22 J	22 J
Building 29	2232 East River	Quinn Ogletree (R)	9/13/2012	36 J	86 J	15 J
Building 33	2373 East River	Jim Worley (R)	9/12/2012	60 J	31 J	20 J
Building 34	2391 East River	Jim Worley (R)	9/12/2012	43 J	26 J	20 J
Building 35	2228 Dryden	Village Park Community Unit 15 (R)	7/31/2012	N/A	4.5 JN	4.8 JN
Building 35	2228 Dryden	Village Park Community Unit 15 (R)	9/11/2012	N/A	47 J	10 UJ

### Notes:

- All analytical results are in units of parts per billion by volume (ppb)
- # - Concentration was greater than applicable ODH Screening Level
- # UJ - Not-detected. Reporting detection limit was greater than applicable ODH Screening Level

 REGISTERED COMPANY FOR  
**ISO 9001**  
 ENGINEERING DESIGN

requires mitigation  
 due to TCE - SS  
 company

potential  
 re-sample  
 location  
 resident is  
 heavy smoker

- J - The chemical was detected by the laboratory, the listed value is an approximate concentration
- JN - The listed value of the tentatively identified compound is an approximate concentration
- UJ - The chemical was not detected in the sample at the approximate detection limit shown.
- N/A - Not applicable - Samples were collected from the crawl space beneath a trailer and reported as indoor air samples.

The data in the above table show that acetaldehyde was detected at similar concentrations in indoor air, sub-slab, and outdoor air samples. In several cases, the acetaldehyde concentration in the indoor air sample was greater than the concentration in the sub-slab sample. If acetaldehyde originated in the soil vapor, it would be expected to be present at the greatest concentrations in the soil vapor and at lesser concentrations in the indoor and ambient air. The data in the table above indicate that the source of acetaldehyde is not soil vapor.

The Region 5 Vapor Intrusion Guidance and other relevant USEPA and Ohio EPA guidance indicates that the use of an attenuation factor of 0.1 (i.e., dilution by 10 times) between sub-slab and indoor air is typically a conservative means of estimating indoor air concentrations based on sub-slab results. During the VI Investigation, CRA collected sub-slab and indoor air samples for radon in order to determine building-specific attenuation factors. The building-specific attenuation factors were all less than 0.1 and were frequently on the order of 0.01, indicating that contaminants diffusing from the sub-slab to indoor air are being diluted by up to 100 times. Analytical results for known sub-slab contaminants such as trichloroethylene (TCE) and tetrachloroethylene (PCE) demonstrate similar attenuation factors between sub-slab and indoor air samples. Therefore, the acetaldehyde results presented above are not consistent with a sub-slab source of acetaldehyde diffusing into indoor air.

The laboratory stated that acetaldehyde is not a commonly-requested analyte and they do not have data on the typical concentrations of acetaldehyde in Summa canister samples. The laboratory stated further, "based on the poor behavior of this analyte, as noted in the project narrative, the reported concentration has greater uncertainty than other target analytes."

The laboratory reported that acetaldehyde is included in the calibration; however, it is a "poor reacting compound" with a high reporting limit and method performance has not been established for acetaldehyde. Three of the sample canisters could not be certified clean for acetaldehyde as the calibration failed for acetaldehyde. Therefore, there is a significant possibility that the acetaldehyde detections are, at least in part, due to issues with the laboratory analysis for this compound.

Acetaldehyde is also ubiquitous in the environment. The USEPA Chemical Summary for Acetaldehyde (USEPA, 1994) states the following with respect to acetaldehyde:

*Acetaldehyde is released into air or wastewater from facilities producing or using the chemical (HSDB 1994). Acetaldehyde is also released to the environment from the combustion and photo-oxidation of hydrocarbons (HSDB 1994). Acetaldehyde is an intermediate product of respiration in higher plants and occurs naturally in many foods, such as ripe fruits that have tart tastes before ripening, and coffee (HSDB 1994). Acetaldehyde is a component of cigarette smoke (HSDB 1994).*

USEPA further reported concentrations of acetaldehyde in ambient air between 5.2 parts per billion (ppb) and 170 ppb. Therefore, it is likely that the acetaldehyde detected in the air samples collected during the VI Investigation is, at least in part, due to sources other than Site contaminants.

Acetaldehyde is not a known Site contaminant and is not persistent in the environment. In soil, acetaldehyde will volatilize rapidly in near-surface and surface soil, leach into the ground, or undergo microbial degradation (USEPA, 1994). Acetaldehyde in water will rapidly degrade or volatilize (USEPA, 1994). Based on the above information, the acetaldehyde concentrations detected in sub-slab, indoor air, and ambient air samples do not appear to be Site contaminants. CRA recommends that the acetaldehyde data be rejected and no further analysis for acetaldehyde be completed.